

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
10 February 2005 (10.02.2005)

PCT

(10) International Publication Number
WO 2005/012687 A1

(51) International Patent Classification⁷: **E21B 33/13**

TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:
PCT/GB2004/003154

(22) International Filing Date: 19 July 2004 (19.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/489,917 25 July 2003 (25.07.2003) US

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW. ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW). Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM). European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR). OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations
- of inventorship (Rule 4.17(iv)) for US only

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(71) Applicants (for all designated States except US): **BP EXPLORATION OPERATING COMPANY LIMITED** [GB/GB]; Chertsey Road, Sunbury on Thames, Middlesex TW16 7BP (GB). **BP CORPORATION NORTH AMERICA INC** [US/US]; 4101 Winfield Road, Warrenville, IL 60555 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ALBERTY, Mark, William** [US/US]; 2918 Rosemary Park Lane, Houston, TX 77082 (US). **ASTON, Mark, Shelton** [GB/GB]; 35 Fairfax Road, Teddington, Middlesex TW11 9DJ (GB). **MCLEAN, Micheal, Richard** [GB/GB]; 8 Riverfield Road, Staines, Middlesex TW18 2EE (GB).

(74) Agents: **COLLINS, Frances, Mary et al.**; BP International Limited, Patents & Agreements, Chertsey Road, Sunbury on Thames, Middlesex TW16 7LN (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,

(54) Title: DRILLING METHOD

(57) Abstract: A method of reducing formation breakdown during the drilling of a wellbore which method comprises: (a) circulating a drilling mud in the wellbore comprising (i) an aqueous or oil based fluid, (ii) at least one fluid loss additive at a concentration effective to achieve a high temperature high pressure (HTHP) fluid loss from the drilling mud of less than 2 ml/30 minutes and (iii) a solid particulate bridging material having an average particle diameter of 25 to 2000 microns and a concentration of at least 0.5 pounds per barrel; (b) increasing the pressure in the wellbore to above the initial fracture pressure of the formation such that fractures are induced in the formation and a substantially fluid impermeable bridge comprising the solid particulate bridging material and the fluid loss additive(s) is formed at or near the mouth of the fractures thereby strengthening the formation; (c) thereafter continuing to drill the wellbore with the pressure in the wellbore maintained at above the initial fracture pressure of the formation and below the breakdown pressure of the strengthened formation.

WO 2005/012687 A1